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(54) METHOD FOR EMBEDDING DIGITAL WATERMARK, METHOD FOR DISTRIBUTING MUSICAL COMPOSITION DATA, METHOD FOR RECORDING MUSICAL COMPOSITION DATA, METHOD FOR REPRODUCING MUSICAL COMPOSITION DATA

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for embedding digital watermark data in musical composition data and for certainly preventing an illegal copy.

SOLUTION: The method for embedding a digital watermark which embeds digital watermark data in musical composition data is characterized by embedding intrinsic musical composition information of the musical composition data in the musical composition data as digital watermark data, and recording the musical composition information on a file provided in further than the musical composition data.

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CLAIMS

[Claim(s)]

[Claim 1] The digital-watermarking embedding approach which is the digital-watermarking embedding approach which embeds digital-watermarking data to musical piece data, and is characterized by what is recorded on the file which was able to establish said musical piece information in addition to said musical piece data while embedding to said musical piece data by using as digital-watermarking data musical piece information on the proper which said musical piece data have.

[Claim 2] The musical piece data distribution approach characterized by distributing the file which recorded on the file which was able to establish said musical piece information in addition to said musical piece data, and recorded the musical piece data with which said digital-watermarking data were embedded, and said musical piece information while embedding to said musical piece data by using as digital-watermarking data musical piece information on the proper which musical piece data have.

[Claim 3] The musical piece data-logging approach characterized by recording on the file which was able to establish said musical piece information in addition to said musical piece data, and recording the musical piece data with which said digital-watermarking data were embedded, and the file which recorded said musical piece information while embedding to said musical piece data by using as digital-watermarking data musical piece information on the proper which musical piece data have.

[Claim 4] The musical piece data embedded considering the musical piece information on the proper which musical piece data have beforehand as digital-watermarking data, The musical piece information embedded as digital-watermarking data to said musical piece data when reproducing the file which is prepared in addition to said musical piece data, and records said musical piece information, The musical piece data playback approach characterized by reproducing said musical piece data only when the musical piece information recorded on the file prepared in addition to said musical piece data is in agreement.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the digital-watermarking embedding approach for preventing the unauthorized use of musical piece data, such as data recorded on record media, such as a memory card, especially music, the musical piece data distribution approach, the musical piece data-logging approach, and the musical piece data playback approach.

[0002]

[Description of the Prior Art] In recent years, the music distribution which does not use record media, such as CD, but distributes them through networks, such as the Internet, is performed in musical piece data, such as music. In such a music distribution, a user downloads and purchases the musical piece data distributed in the network etc. The downloaded musical piece data are saved at a memory card, and a user can enjoy music with the regenerative apparatus which reproduces this. At this time, with musical piece data, a music signal may be digitized as it is, and may be recorded, or it may compress, or may distribute as performance data, such as MIDI. In distributing by MIDI, a MIDI sound source etc. is used and it is performing music playback to the playback side.

[0003]

[Problem(s) to be Solved by the Invention] By the way, MP3, MF, etc. have the file format to which the copy guard function for preventing an illegal copy from the first is not performed in a music distribution, these files are copied, illegal distribution by the Internet etc., upload to a homepage etc., etc. are performed, and the illegal copy of these musical piece data poses a problem. Therefore, this invention aims at preventing an unauthorized use and illegal copy of the musical piece data used for a music distribution.

[0004]
[Means for Solving the Problem] The digital-watermarking embedding approach which is the digital-watermarking embedding approach which embeds digital-watermarking data to musical piece data, and is characterized by what is recorded on the file which was able to establish said musical piece information in addition to said musical piece data while embedding to said musical piece data by using as digital-watermarking data musical piece information on the proper which said musical piece data have in order to solve the technical problem mentioned above is offered.
[0005] Moreover, while embedding to said musical piece data by using as digital-watermarking data musical piece information on the proper which musical piece data have, it records on the file which was able to establish said musical piece information in addition to said musical piece data, and the musical piece data distribution approach characterized by distributing the musical piece data with which said digital-watermarking data were embedded, and the file which recorded said musical piece information is offered.
[0006] Furthermore, while embedding to said musical piece data by using as digital-watermarking data musical piece information on the proper which musical piece data have, the musical piece data-logging approach characterized by recording on the file which was able to establish said musical piece information in addition to said musical piece data, and recording the musical piece data with which said digital-watermarking data were embedded, and the file which recorded said musical piece information is offered.
[0007] Furthermore, the musical piece data embedded considering the musical piece information on the proper which music data have as digital-watermarking data, The musical piece information embedded as digital-watermarking data to said musical piece data when reproducing the file which is prepared in addition to said musical piece data, and records said musical piece information, Only when the musical piece information recorded on the file prepared in addition to said musical piece data is in agreement, the musical piece data playback approach characterized by reproducing said musical piece data is offered.
[0008]
[Embodiment of the Invention] Hereafter, the digital-watermarking embedding approach concerning this invention, the musical piece data distribution approach, the musical piece data-logging approach, and the musical piece data playback approach are explained. In recent years, personal digital assistants, such as a cellular phone and PHS, are equipped with the record medium which memorizes musical piece data, such

as a memory card, and a system which downloads musical piece data is proposed.

[0009] There is an SD memory card as a format which can describe such musical piece data. Hereafter, with reference to a drawing, the regenerative apparatus of SD memory card and SD memory card is explained. The block diagram in which drawing 1 shows a sound format of SD audio, the explanatory view in which drawing 2 shows management of sound data typically, the explanatory view in which drawing 3 shows management of still picture data and an animation typically, the explanatory view in which drawing 4 shows management of wave form and audio data typically, and drawing 5 are the explanatory views showing management of DLS data typically.

[0010] Moreover, it is the explanatory view in which drawing 6 shows the block diagram of a regenerative apparatus, and drawing 7 shows truck management of a play list typically. The explanatory view showing in detail the play list manager (PLMG) of PLM whose drawing 8 is the management area of drawing 1 , The explanatory view in which drawing 9 shows a format of the play list manager information (PLMGI) of drawing 8 in detail, Drawing showing the truck information #1 (TKI#1) with the truck information manager (TKMG) whose drawing 10 is the management area of drawing 1 in detail, The explanatory view in which drawing 11 shows a format of the truck general information (TKGI) of drawing 10 in detail, Drawing in which drawing 12 shows a POB manager (POBMG) in detail, the explanatory view in which drawing 13 shows the VOB manager (VOBMG) of drawing 1 in detail, The explanatory view in which drawing 14 shows the WOB manager (WOBMG) of drawing 1 in detail, Drawing in which drawing 15 shows a format of the WOB count information (WOBCI) of drawing 14 in detail, Drawing in which drawing 16 shows the AOB manager (AOBMG) of drawing 1 in detail, the explanatory view in which drawing 17 shows the DOB manager (DOBMG) of drawing 1 in detail, Drawing which drawing 18 gathers each presentation data of drawing 1 , and is shown, drawing 19 (A), Drawing in which (B) shows the still picture object POB of drawing 18 in detail, drawing 20 (A), drawing in which drawing in which drawing in which (B) shows the video (animation) object VOB of drawing 18 in detail, drawing 21 (A), and (B) show the wave form object WOB of drawing 18 in detail, drawing 22 (A), and (B) show the down RODABURU sound object DOB of drawing 18 in detail -- it comes out.

[0011] Drawing 1 is drawing arranging in parallel and showing each file format of SD sound directory (sound object set) and the conventional SD audio directory (audio object set).

[0012] PLMG (play list manager) and TKMG (truck information manager) of SD sound directory constitute the 2nd management area, and as the sound PLMG of SD sound

directory is shown in drawing 8 , they have the play list manager information (PLMGI) shown in drawing 9 in detail, a default play list information (DPLI), and play list information #1 - #n (however, it is n<=99).

[0013] PLMGI (play list manager information) mentioned above As shown in drawing 9 in detail, the ID(PLMG_ID):2 byte of PLMG, Hold field : 2 bytes, the ID(SDS_ID):8 byte of SD sound, The figure of a specification document version : 2 bytes, the number:2 byte of a play list, The truck number reproduced first (PLMG_AP_PL) : 4 bytes, The truck number which was being reproduced at the end and time amount from the head of music (PLMG_RSM_PL): 8 bytes (after turning off the power during playback) The data used for the so-called resume playback which carries out playback initiation from the place currently reproduced at the end when a power source was switched on again, PLMG application attribute:2 byte, a hold field: It has 6 bytes.

[0014] Moreover, TKMG of SD sound directory has truck information (TKI) #1 - #n (however, n<=9999), as shown in drawing 10 in detail. Furthermore, truck information #1 - #n has the truck general information (TKGI) shown in drawing 11 , and a truck text information data area (TKTXTI_DA), as shown in drawing 10 in detail. Moreover, as shown in drawing 11 in detail, TKGI (truck general information) The ID(TKI_ID):2 byte of TKI, and the number of TKI (TKIN) : 2 bytes, The block attribute of TKI (TKI_BLK_ATR) : 2 bytes, Hold field : 2 bytes and the size (TKI_SZ):4 byte of TKI, Playback time amount of a truck (TKI_PB_TM) : 4 bytes and the sound attribute (TKI_SOB_ATR):4 byte of TKI, Hold field : 4 bytes and truck POB/VOB attribute (TKI_PVOB_ATR):2 byte, Hold field : 2 bytes and the hold field:7 byte for copyright management information, Hold field : 1 byte and the attribute (TKI_TI1_ATR):2 byte of a text 1, The attribute of a text 2 (TKI_TI1_ATR) : 2 bytes, Hold field : 4 bytes and ISRC code (ISRC):10 byte, TKI application attribute (TKI_APP_ATR) : 2 bytes, Hold field : 20 bytes and truck POB/VOB search pointer (TKI_PVOB_SRP):80 byte, Truck WOB/AOB search pointer (TKI_WAOB_SRP): It consists of 80 bytes and truck DOB search pointer (TKI_DOB_SRP):20 byte. Moreover, the ISRC code (ISRC) is constituted as shown in drawing 25 in detail.

[0015] And the still picture object manager POM of SD sound directory has a POB manager information (POBMGI) and a POB count information (POBCI) (however, n<=999), as shown in drawing 12 . this POBCI (POB count information) -- reference number-of-counts [of the n above-mentioned POB(s)] (POB_RCN): -- 2 bytes each -- in addition to this -- ** -- it is constituted.

[0016] Moreover, the video object manager VOM of SD sound directory (=VOBMG) has a VOB manager information (VOBMGI) and a VOB count information (VOBCI)

(however, n<=999), as shown in drawing 13 . this VOBCI (VOB count information) -- reference number-of-counts [of the n above-mentioned VOB(s)] (VOB_RCN): -- in addition to this, it comes out each with 2 bytes, and is constituted.

[0017] The wave object manager WOM (= WOBMG) of SD sound directory has a WOB manager information (WOBMGI) and a WOB count information (WOBCI) (however, n<=999), as shown in drawing 14 . this WOBCI (WOB count information) -- reference number-of-counts [of the n above-mentioned WOB(s)] (WOB_RCN): -- it consists of 2 bytes each and hold field:42 byte of others. As this WOB_RCN (reference number of counts of WOB) is shown in drawing 15 , it becomes 14 bits of reference counts from 2 bits of data existence flags, and a data existence flag is set to 01b when WOB does not exist, and it exists, 00b and.

[0018] The audio object manager AOM (= AOBMG) of SD sound directory constitutes the 1st management area, and as shown in drawing 16 , it has an AOB manager information (AOBMGI) and an AOB count information (AOBCI) (however, n<=999). this AOBCI (AO count information) -- reference number-of-counts [of the n above-mentioned AO(s)] (AOB_RCN): -- it consists of 2 bytes each and hold field:42 byte of others. This AOB_RCN (reference number of counts of WOB) serves as 14 bits of reference counts from 2 bits of data existence flags, and a data existence flag is set to 01b when AOB does not exist, and it exists, 00b and.

[0019] The DLS object manager DOM of SD sound directory (= DOBMG) has a DOB manager information (DOBMGI) and a DOB count information (DOBCI) (however, n<=999), as shown in drawing 17 . this DOBCI (DOB count information) -- reference number-of-counts [of the n above-mentioned DOB(s)] (DOB_RCN): -- it consists of 2 bytes each and hold field:42 byte of others. This DOB_RCN (reference number of counts of DOB) serves as 14 bits of reference counts from 2 bits of data existence flags, and a data existence flag is set to 01b when DOB does not exist, and it exists, 00b and.

[0020] Each presentation data of SD sound directory consists of the sound object SOB, the still picture object POB, the video object VOB, a wave object WOB, and a DLS object DOB so that it may collect into drawing 18 and may be shown. The sound object SOB is described by the format 1.0 of a standard MIDI file format (SMF). In addition, SMF supports a meta-event. Moreover, compression and digital watermarking are given.

[0021] The still picture object POB mentioned above is recorded by the following three types.

(1) Encryption JPEG (drawing 19 (A)) : it consists of one still picture.

(2) The reference pointer of a JPEG file (drawing 19 (B))
(3) JPEG without a header (based on a format of Exif Ver.2.1)
And the video object VOB mentioned above is recorded by the following three types.
(1) Encryption MPEG-4 (drawing 20 (A)) : it consists only of one continuation animation.
(2) The reference pointer of MPEG-4 file (drawing 20 (B))
(3) MPEG-4 without a header (especially based on the level 1 of a simple profile / format of 2/3)
Furthermore, the wave object WOB is recorded by the following three types.
(1) Encryption Windows (trademark) WAVE file (drawing 21 (A)) : it consists only of one sound effect.
(2) The reference pointer of a Windows WAVE file (drawing 21 (B))
(3) A Windows WAVE file without a header (especially based on a format of 8 bits / 16 bits, and a monophonic recording/stereo (8kHz / 11kHz / 22kHz))
Moreover, the DLS (down loader bull sound) object DOB is recorded by the following three types.
(1) Encryption DLS file (drawing 22 (A)) : it consists only of one tone.
(2) The reference pointer of a DLS file (drawing 22 (B))
(3) A DLS file without a header (based especially on level 2 and a format of Ver.1.0)
In addition, the identifier which identifies a ringer melody is prepared in the above-mentioned sound object SOB. For example, it is discriminable by the application category ID being defined by -01h:music, 02h:karaoke, the 03h:presentation, 04h:reading, and the 05h:ringer melody by DPLI application attribute DPLI_APP_ATR arranged to the general information in the default play list information DPLI of drawing 8 .
[0022] Next, with reference to drawing 2 , regeneration of the regenerative apparatus of this 1st operation gestalt is explained typically. First, in drawing 2 , if the default play list DPLI (shown in drawing 8) is chosen as a play list concerning playback, refer for default Prairie SUTOTORAKKUSACHI pointer DPL_TK_SRP#1 arranged there with reference to truck information TKI#1 of the truck manager TKMG (shown in drawing 10) to the sound object SOB 1, for example, SOB0001.SS, to which TKI#1 corresponds. Refer for default Prairie SUTOTORAKKUSACHI pointer DPL_TK_SPR#2 with reference to TKI#2 of the truck manager TKMG like the following to the sound object SOB, for example, SOB0002.MID, to which truck information TKI#2 correspond. Thus, the sound object SOB is continuously reproduced according to the list of appointed.

[0023] Next, with reference to drawing 3 , regeneration of the regenerative apparatus of this 2nd operation gestalt is explained typically. First, in drawing 3 , if play list PLI#1 (shown in drawing 8) is chosen as a play list concerning mixture playback of a still picture and an animation Play list POB/VOB search pointer PLI_PVOB_SRP#1 arranged there refers to truck information TKI#i of the truck manager TKMG (shown in drawing 10). Default play list POB/VOB search pointer DPLI_PVOB_SRP#1 (arranged to the general information DPLGI of the head of the default play list information DPLI of drawing 8) Moreover, the truck manager TKMG With reference to truck information TKI#i of (being shown in drawing 10), the corresponding still picture object POB 1, for example, POB003.SP, is referred to. On the other hand, the animation object VOB 1, for example, VOB003.SV, is referred to similarly. Thus, when the sound object SOB is reproduced according to the list of appointed, a still picture and an animation can be reproduced to coincidence.

[0024] Then, with reference to drawing 4 , regeneration of the regenerative apparatus of this 3rd operation gestalt is explained typically below. First, in drawing 4 , if play list PL#i (shown in drawing 7) for which a user asks as a play list concerning playback is chosen, refer to the WOB001.WAV for TKI#k with reference to truck information TKI#k of the truck manager TKMG (shown in drawing 10) to which PUREIRISUTO truck search pointer PL_TK_SRP#1 arranged there corresponds the web object WOB, at for example, the time of k= 1, which corresponds by TKI_WAOB_SRP (shown in drawing 11). Moreover, on the other hand, the audio object AOB of assignment in an audio directory is accessed so that the arrow head of drawing 1 may explain with reference to audio manager AOM/AOBMG (drawing 16), for example, AOB001.SA1 (audio signal) is read, and it reproduces synchronizing with web object WOB001.WAV (sound effect). According to play list PL#i, the audio object AOB is accessed like the following, AOB002.SA1 is read, the web object WOB is accessed, for example, it reproduces synchronizing with WOB002.SW1.

[0025] In addition, the audio objects AOB are devices, such as a player only for audios which does not support a sound, and it may be deleted or they may be rewritten. In order to check whether AOB which the truck information TKI is expecting and referring to exists rightly, when 12 bits of low order of the byte size of AOB are stored in truck WOB/AOB search pointer TKI_WAOB_SRP in TKI and this value examines before playback whether it is the right, it prevents reproducing different AOB.

[0026] Moreover, with reference to drawing 5 , regeneration of the regenerative apparatus of this 4th operation gestalt is explained typically below. First, if play list PL#i (shown in drawing 7) for which a user asks as a play list concerning playback is

chosen in drawing 4 Truck information TKI#k of the truck manager TKMG (shown in drawing 10) to which PUREIRISUTO truck search pointer PL_TK_SRP#1 arranged there corresponds is referred to. Refer to the DOB001.DLS (tone information on a sound source) for TKI#k the DSL object DOB, at for example, the time of k= 1, which corresponds by TKI_DOB_SRP (shown in drawing 11). According to play list PL#i, the audio object DOB is accessed like the following, for example, DOB002.SD1 is read, and it reproduces continuously with a sound signal.

[0027] The above operation gestalt is processed with the regenerative apparatus specifically shown in drawing 6 . First, the SD memory card 51 is accessed in good order in the access section 52 by the control section 57 by the actuation from a control unit 56. The access section 52 takes out SOB which is the Maine data, supplies it to a sequencer 53, and acquires a pronunciation control signal. Moreover, the access section 52 takes out the wave object WOB, the DLS object DOB, the audio object AOB, the still picture object POB, and the video object VOB, and supplies them to the decoding section 54 with a pronunciation control signal. Processing of the concrete control section 57 is explained with drawing 23 . In drawing 23 , sound data are first accessed with reference to management area (step S51) based on it (step S52). Furthermore access still picture data (step S53), and this will be accessed if the video data is recorded (step S54). When you need audio data, it accesses this (step S55), and data processing of them is systematically carried out by the decoding section 4 (step S56). It will repeat, if it is not termination (it is N at step S57). It will end, if it is termination (it is Y at step S57). Therefore, the regenerative apparatus of SD memory card concerning this invention is reproduced with reference to the management area of SD memory card shown in drawing 1 .

[0028] In addition, although sounding the musical instrument of 16 to coincidence fundamentally can only do one MIDI device Define uniquely the meta-event for directing to change and output a part of sound object SOB to another port, and it describes to SOB. It also becomes possible to perform a gorgeous musical piece which plays 16 or more musical instruments to coincidence with distributing and outputting the part which interprets the meta-event at the time of playback, and is assigned to another port to another MIDI device added further.

[0029] Next, the record approach for SD memory card concerning this invention is explained. Drawing 24 is a flow chart for explaining the record actuation to SD memory card of drawing 1 . In drawing 24 , the data which created sound data (step S62), created still picture data with reference to management area (step S61) (step S63), created the video data (step S64), and created and (step S65) they-created

management data based on each data are recorded on SD memory card (step S66), and if it is not termination (it is N at step S67), it will repeat. Therefore, the record approach to SD memory card concerning this invention records, referring to management area, when using SD memory card shown in drawing 1 as an archive medium. In addition, you may make it the ISRC code (ISRC) shown in drawing 25 add what scrambled to the reserve field of 56-75. Moreover, you may use for playback by judging coincidence and an inequality, as digital watermarking is put into a still picture or an animation.

[0030] Drawing 26 is drawing showing the configuration of the terminal equipped with such an SD memory card 1. 1 is SD memory card and the SD_SOUND.PLM file 2, the SD_SOUND.TKM file 3, and the SOB1234.MID file 4 that is a Standard MIDI File (SMF) are stored in the interior of the SD memory card 1. And only when ISRC which is contained in the description field of ISRC and digital watermarking of SMF from these files 2, 3, and 4 is in agreement, playback of a musical piece is performed by the musical piece playback sequencer section 5 and the MIDI sound source 6 which reproduce a musical piece, and the loudspeaker (or headphone) 7.

[0031] Next, actuation of the equipment shown in drawing 26 is explained using drawing 27 . If playback of a musical piece is required (step S1), the SD_SOUND.PLM file 2 will be read (step S2), then the SD_SOUND.TKM file 3 will be read (step S3). Furthermore, the musical piece information (ISRC) described by TKI of the SD_SOUND.TKM file 3 is read (step S4), and this musical piece information is memorized as musical piece information A to coincidence (step S5). Next, the SOB1234.MIDI file 4 which is SMF is read (step S6), and digital watermarking described by SOB1234.MID is read (step S7). The musical piece information (ISRC) described by coincidence at this digital watermarking is memorized as musical piece information B (step S8). And the comparison with the musical piece information A and the musical piece information B is performed (step S9), when ISRC is in agreement, a musical piece (it is Y at step S9) is reproduced, and when not in agreement, playback of a musical piece (it is N at step S9) is stopped.

[0032] Next, the example which decodes the musical piece information A by using ID of a terminal as a password is explained using drawing 28 . If playback of a musical piece is required (step S11), the SD_SOUND.PLM file 2 will be read (step S12), then the SD_SOUND.TKM file 3 will be read (step S13).

[0033] Furthermore, ID of a terminal is read (step S14) and the musical piece information (ISRC) described by TKI of the SD_SOUND.TKM file 3 is read (step S15). And the musical piece information A is decoded by using ID of a terminal as a

password (step S16), and this musical piece information A is memorized (step S17). Next, the SOB1234.MIDI file 4 which is SMF is read (step S18), and digital watermarking described by SOB1234.MID by using ID of a terminal as a password is read (step S19). The musical piece information (ISRC) described by coincidence at this digital watermarking is memorized as musical piece information B (step S20). And the comparison with the musical piece information A and the musical piece information B is performed (step S21), when ISRC is in agreement, a musical piece (it is Y at step S21) is reproduced, and when not in agreement, playback of a musical piece (it is N at step S21) is stopped. And the musical piece information to which playback was permitted is performed by the playback sequencer section 5, and is used for karaoke, BGM, etc.

[0034] Thus, since it is necessary to destroy a part of contents itself and the quality of contents is spoiled, in case digital-watermarking data are removed, in order that a digital-watermarking technique may change some contents and may embed the digital-watermarking data in connection with copyright to direct contents, when digital-watermarking data are removed and it reproduces, the utility value as contents falls greatly, without performing perfect restoration. With such a digital-watermarking technique, the illegal copy is prevented using this point.

[0035] In addition, although MIDI data are used as a musical piece file in this example, the audio file by which usual was digitized is sufficient as this. That is, what recorded the music signal as it was, or compressed AAC (advanced audio coding) etc., and was recorded by the PCM signal may be used.

[0036] Next, the situation of download of a musical piece file is explained. In drawing 29 , a user chooses a desired musical piece from the chart of the musical piece of the musical piece file displayed on the cellular phone 11 which is a terminal side, and the request to the server 12 of the service provider which distributes a musical piece file is performed (step S100). It may be stored in the server 12 even if the chart of a musical piece is stored in terminal sides (the device connected to the cellular phone 11 or the cellular phone 11, or personal computer which a user uses) at this time. Furthermore, the terminal which requests may not be the cellular phone 11 which downloads a musical piece, but may be a personal computer which the terminal and user of dedication use. And a cable or wireless may be used for the connection a server 2 and by the side of a terminal, and it may be connected through the Internet etc. In addition, it may not be the format of the chart mentioned above, or a user searches a desired musical piece and it is made to carry out direct selection of him.

[0037] Here, the user whose telephone number of a personal digital assistant 11 is

090-1234-5678 presupposes that the musical piece Artist's A "B" was requested. The cellular phone 11 which receives a message may be equipped with the words text display function used by the MIDI sound source, the MIDI sequencer, karaoke, etc., the background-image display function similarly used by karaoke etc. from a musical piece file being used as karaoke or BGM only as a mere musical piece file. Of course, when not using it as karaoke, it is necessary to equip neither a words text display function nor a background-image display function.

[0038] First, in using various communications services from the menu screen of a cellular phone 11, the screen for needed connection is called and a connection menu is displayed. Then, the connection with a server 12 from a cellular phone 11 is started, and a basic menu is displayed. Here, if the chart which chooses a musical piece like a musical piece file download list, a karaoke download list, or a BGM download list from the lists displayed with the basic menu is chosen and chosen, a musical piece is displayed in the form of a chart, and a user can choose the musical piece Artist's A "B." If the musical piece Artist's A "B" is found here, download of a musical piece file will be requested to a server 12 from a cellular phone 11. At a server 12, although this request is received, whenever a user requests download, in the user authentication section by the side of a server 2 (not shown), accounting for every musical piece may be carried out at this time. At this time, also carrying out accounting at the time initiation of download and in the middle of download and carrying out, after download ends actual accounting in consideration of the case where it is possible and a circuit goes out in the middle of download further are also considered. Moreover, it is also possible to perform accounting which combined these.

[0039] Furthermore, as long as service of this download is a membership system, the input of a password may be demanded from a member and a security side may be strengthened. Moreover, when it has by carrying out a cellular phone 11 as a terminal, you may identify automatically that he is the member with the telephone number (this example 090 -1234 -5678) of a cellular phone 11.

[0040] Next, the example at the time of using a password using drawing 30 similarly is explained. Data required for the memory card (here, the SD memory card is temporarily explained to an example) with which the terminal side was equipped are written in at the same time it distributes required data with the flow chart of drawing 30 .

[0041] First, in a server 12 side, the digital-watermarking data mentioned above with the watermark embedding encoder 13 are embedded to the musical piece file Artist's A "B." This is temporarily embedded to the musical piece file downloaded to a user,

and embedding of digital-watermarking data is not performed to the musical piece file itself stored in the server 2. Therefore, the musical piece file of the musical piece "B" of the artist A of a radical itself does not change. Since ID of a terminal differs for every terminal, when it is serious by the server 12 side to perform watermark encoding and encryption of musical piece information each time, by deciding the specific password for every musical piece, it is in the condition into which the watermark went beforehand, and a musical piece file can be put on a server 12.

[0042] It can avoid changing a password per terminal by this, and the complicatedness which carries out the circle code of the watermark for every terminal can be lost.

[0043] Thus, the musical piece file which had digital-watermarking data embedded is downloaded to the SD memory card by the side of a user's terminal (cellular phone 11).

[0044] In addition, since the contents which are reproduced at terminals other than the user terminal which requested download, and are described by SD_SOUND.TKM also as a way differ when it takes out to the terminal which changes a musical piece file with a user's illegal copies, it is unreproducible.

[0045] Moreover, the musical piece file which had digital-watermarking data embedded by the digital-watermarking embedding approach concerning this invention It is copied to the hard disk drive unit used for a personal computer etc. When using it with cellular phones other than the user of normal, once removing digital-watermarking data, Although the telephone number of the cellular phone to be used must be again embedded as digital-watermarking data, this is a technical very difficult activity, and since the quality of the musical piece of a radical will deteriorate greatly even if it is able to carry out, the value which will be carried out as a musical piece file and to carry out will be lost. Moreover, if the data according to use or individual mentioned above (for example, telephone number) are used together as a password by using ID of a proper etc. as digital-watermarking data at the hardware of the actually used body of a cellular phone, it will become still more powerful illegal copy prevention. In addition, since musical piece information (ISRC) is written to the TKI field of SD_SOUND.TKM, the decoder for decoding this is needed for a terminal side. Extent to which may write TSRC as it is, without enciphering when this influences parenchyma top cost, and an easy scramble is applied is sufficient.

[0046] Next, the example of offer of a musical piece file is explained using drawing 31 . First, packet communication connection is started by the terminal side, such as a cellular phone 11, (step S111). To the demand of the connection from a terminal side, by the server 12 side, connection is permitted and a basic service menu is transmitted (step S112). In a cellular phone 11, the basic service menu sent from the server 12 is

displayed (step S113), and the menu for downloading a musical piece file is requested (step S114).

[0047] In a server 12 side, a musical piece file search menu is transmitted to a cellular phone 11 in response to this request (step S115). In a cellular phone 11, this retrieval menu is displayed and a user chooses a desired musical piece file based on this (step S116 – step S118).

[0048] At a terminal side, the request of the selected musical piece file is required of a server 12, and by the server 12, when processing of a user's authentication, a member's authentication, accounting, download authorization, etc. is performed (step S120) and download is not permitted, the display of a required procedure or warning is performed to a cellular phone 11 (step S121). When download is permitted, it embeds at a musical piece file by using musical piece information (for example, ISRC) as digital-watermarking data, acquiring the telephone number of a cellular phone 11, and ID of a terminal proper by the server 12 side a user's proper data and here (step S122), and using this proper data as a password (step S124). And at a terminal, the musical piece file which had watermark data embedded is incorporated (step S125).

[0049] Next, the concrete approach of digital-watermarking data to embed is explained. In this example, as digital-watermarking data or a password for TKI, it is referred to as the telephone number of a cellular phone 11, or ID of a terminal proper, and the musical piece file is used as MIDI data. For example, to the MIDI event in MIDI data, the digital-watermarking data mentioned above are added or permuted, and are embedded. In addition, the embedding algorithm of the digital-watermarking data to MIDI data is not limited to this.

[0050] And when enciphering the digital-watermarking data mentioned above or enciphering the MIDI data which had digital-watermarking data embedded, a digital-watermarking embedding algorithm can be concealed by using a common key.

[0051] It is possible to use the hard recognition number of the proper which ID which the user set up, a password, and a cellular phone 11 own as a common key here etc. Also when the MIDI data which embedded digital-watermarking data outside by using such a common key are taken out, the resistance of the attack on digital-watermarking data can be given. When especially a common key does not need to be cultured, it may be set as the value of immobilization, such as "0000", or the password according to individual may be prepared for every musical piece. Even if it is not every musical piece, a fixed password may be prepared for every contractor who distributes every genre of every month by which the musical piece was released, or a musical piece, and a musical piece.

[0052] Moreover, the common key mentioned above as a password at the time of enciphering may be given to the watermark data indicated to Japanese Patent Application No. No. 302095 [11 to] by these people to the data which added error detecting code.

[0053] For example, when the data in which embedding is possible as digital-watermarking data are 8 bytes, it becomes possible about this to describe a break and the telephone number to a maximum of 16 figures at a time to 4 bits. Or it is good also considering the telephone number once enciphered with the common key mentioned above as 8 bytes of digital-watermarking data. Since it generally becomes easy [the embedding algorithm of digital-watermarking data] for the embedding algorithm of digital-watermarking data and the data with which digital watermarking was embedded to be given to the aggressor to digital-watermarking data, and to decode digital-watermarking data from these two elements by exhibiting it. Like ISRC and the musical piece management number in a company, the code which cannot be directly known from a user is better.

[0054] Thus, in order to enable it for other terminals to use the MIDI data which had digital-watermarking data embedded, the data currently embedded as digital watermarking are eliminated first, further, the telephone number of their cellular phone and ID of a terminal must come to hand, and musical piece information, such as ISRC, must be again embedded as digital-watermarking data by making this into a password. Since musical piece information, such as ISRC, is difficult for this to come to hand since it is not opened to the public, these activities are almost impossible, and since the direction where the twist to which the time and effort is applied also purchases MIDI data becomes cheap far in cost, an inaccurate poppy etc. can be prevented.

[0055] As mentioned above, although the case where a musical piece file was reproduced was made into the example and explained, prevention of an illegal copy can be made into a more positive thing by supposing that it is refreshable, only when digital-watermarking data are embedded according to an individual to each data, such as words character representation data which it downloads to coincidence in using a musical piece file by karaoke etc., and they are all in agreement.

[0056] In addition, in a format of a musical piece file like SMF, the MIDI data which had digital-watermarking data embedded are stored in a truck chunk (Track Chunk).

[0057]

[Effect of the Invention] As mentioned above, as explained in full detail, according to the digital-watermarking embedding approach concerning this invention, the musical piece data distribution approach, the musical piece data-logging approach, and the

musical piece data playback approach The same information is described to the watermark information on the general information description field of an SD memory card, and a file. As musical piece information data which make refreshable when this is in agreement, and should be further described to the general information description field of digital watermarking and the above-mentioned memory card by using proper data and the telephone numbers of a terminal, such as a cellular phone, as a common key The effectiveness that the illegal copy of a musical piece file can be prevented by describing to a musical piece file is done so.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view showing one gestalt of the audio format of SD audio recorded on SD memory card, and a sound format of SD audio.

[Drawing 2] It is the explanatory view showing management of sound data typically.

[Drawing 3] It is the explanatory view showing management of still picture data and an animation typically.

[Drawing 4] It is the explanatory view showing management of wave form and audio data typically.

[Drawing 5] It is the explanatory view showing management of DLS data typically.

[Drawing 6] The block diagram of a regenerative apparatus is shown.

[Drawing 7] It is the explanatory view showing truck management of a play list typically.

[Drawing 8] It is the explanatory view showing a play list manager (PLMG) in detail.
[Drawing 9] It is the explanatory view showing a format of a play list manager information (PLMGI) in detail.
[Drawing 10] It is drawing showing the truck information #1 (TKI#1) with a truck information manager (TKMG) in detail.
[Drawing 11] It is the explanatory view showing a format of a truck general information (TKGI) in detail.
[Drawing 12] It is drawing showing a POB manager (POBMG) in detail.
[Drawing 13] It is the explanatory view showing a VOB manager (VOBMG) in detail.
[Drawing 14] It is the explanatory view showing a WOB manager (WOBMG) in detail.
[Drawing 15] It is drawing showing a format of a WOB count information (WOBCI) in detail.
[Drawing 16] It is drawing showing an AOB manager (AOBMG) in detail.
[Drawing 17] It is the explanatory view showing a DOB manager (DOBMG) in detail.
[Drawing 18] It is drawing showing each presentation data collectively.
[Drawing 19] It is drawing showing the still picture object POB in detail.
[Drawing 20] It is drawing showing the video (animation) object VOB in detail.
[Drawing 21] It is drawing showing the wave form object WOB in detail.
[Drawing 22] It is drawing showing the down RODABURU sound object DOB in detail.
[Drawing 23] It is a flow chart for explaining actuation of the regenerative apparatus of SD memory card.
[Drawing 24] It is a flow chart for explaining the record actuation to SD memory card.
[Drawing 25] It is drawing showing ISRC in detail.
[Drawing 26] It is drawing showing one example of the terminal unit concerning this invention.
[Drawing 27] It is the flow chart which shows actuation of the musical piece playback sequencer section of the terminal unit concerning this invention.
[Drawing 28] It is the flow chart which shows other actuation of the musical piece playback sequencer section of the terminal unit concerning this invention.
[Drawing 29] It is the block diagram showing the musical piece encoding section concerning this invention.
[Drawing 30] It is the flow chart which shows actuation of the musical piece encoding section concerning this invention.
[Drawing 31] It is the flow chart which shows the data distribution approach concerning this invention.
[Description of Notations]

1 SD Memory Card
2 SD_SOUND.PLM
3 SD_SOUND.TKM
4 SOB1234.MID
5 Musical Piece Playback Sequencer Section
6 MIDI Sound Source
7 Loudspeaker